COVID-19 Pandemic: Are We Back to Normal?

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To the Editor:

We enthusiastically support Mahmoudinezhad and colleagues in their article "COVID-19 Pandemic: Are We Back to Normal?" and wish to add our heightened concern for open-angle glaucoma (OAG) patients of African descent (AD). COVID-19 infection disproportionally affects the African American population with Johns Hopkins University and American Community Surveys reporting rates of infection and death 3 times higher in majority Black counties when compared with majority White counties.[1,2] Similar to COVID-19 infection, OAG also disproportionately affects persons of AD, who are on average 6 times more likely to be diagnosed with OAG, and experience earlier onset and increased severity compared with those of European decent (ED).[3,4] The higher rates of both glaucoma and COVID-19 infection and their complications suggest the valid concerns of maintaining appropriate disease management outlined by Mahmoudinezhad and colleagues and novel approaches to maintain care are especially important for persons of AD.

Elevated intraocular pressure (IOP) has long been identified as a strong contributor to glaucoma pathophysiology. However, many patients with OAG either do not exhibit elevated IOP or experience continued disease progression despite low or medically reduced IOP, thus highlighting the multifactorial nature of the disease. Low ocular perfusion and/or impaired ocular circulation have long been identified as contributory mechanisms of OAG[5] and persons of AD are known to have considerably higher rates of

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cardiovascular diseases, with early onset and high levels of severity.[6] In our laboratories, we previously identified how ocular vascular health may be a more significant contributing factor in OAG patients of AD compared with ED. Significantly, we found lower blood flow biomarkers in all retrobulbar blood vessels including those supplying the retina and optic nerve head in OAG patients of AD compared with ED.[7] In addition, significantly larger reductions in retinal capillary and retrobulbar blood flow were identified and strongly correlated with OAG changes in optic nerve head structure and macular thickness over 4 years in OAG patients of AD compared with ED.[8] Furthermore, we observed higher venous retinal oxygen values and lower arterial venous difference (an estimation of retinal capillary oxygen extraction) in OAG patients of AD compared with patients of ED with statistically similar IOP and OAG disease stage status.[9]

Importantly, preliminary data suggests COVID-19 causes microvascular damage, inflammation, and thrombosis in various organs. Patients suffering from COVID-19 were found to have extensive endothelial injury and thrombi with microangiopathy throughout the lungs on autopsy.[10,11] When compared with the autopsy of patients with influenza, patients with COVID-19 were 9 times more likely to have microthrombi present in the alveoli.[10] Elevations of D-dimer and antiphospholipid antibodies support the proposed role of COVID-19 in the development of vascular disease and thrombogenesis.[11] The damage caused by COVID-19 to the microvasculature of various organs systems such as the lungs may explain the higher rates of disease complications and death among patients with underlying cardiovascular comorbidities.[12] Insult to the microvasculature is thus a shared characteristic of both COVID-19 and glaucoma, and this mechanistic overlap highlights the urgent need to understand if COVID-19 elevates glaucoma risk in patients whose vascular health is compromised, especially in persons of AD.

We strongly support the concerns for appropriate ophthalmic disease management discussed by Mahmoudinezhad and colleagues as COVID-19 represents an emerging and immediate threat to human

welfare and medical resource allocations. The shared vascular pathologies and similar epidemiological disparities between COVID-19 infection and OAG is a significant concern to be explored. In view of this, we suggest for the first time that a COVID-19 infection with its known microvascular insult may elevate the risk for glaucoma onset and progression especially in high-risk patient groups with vascular comorbidities and encourage clinicians to be aware of the possible elevated risk in persons of AD infected by COVID-19.

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